Material Property Prediction for Freeze-Thaw

Karen Henry and Larry Danyluk, CRREL

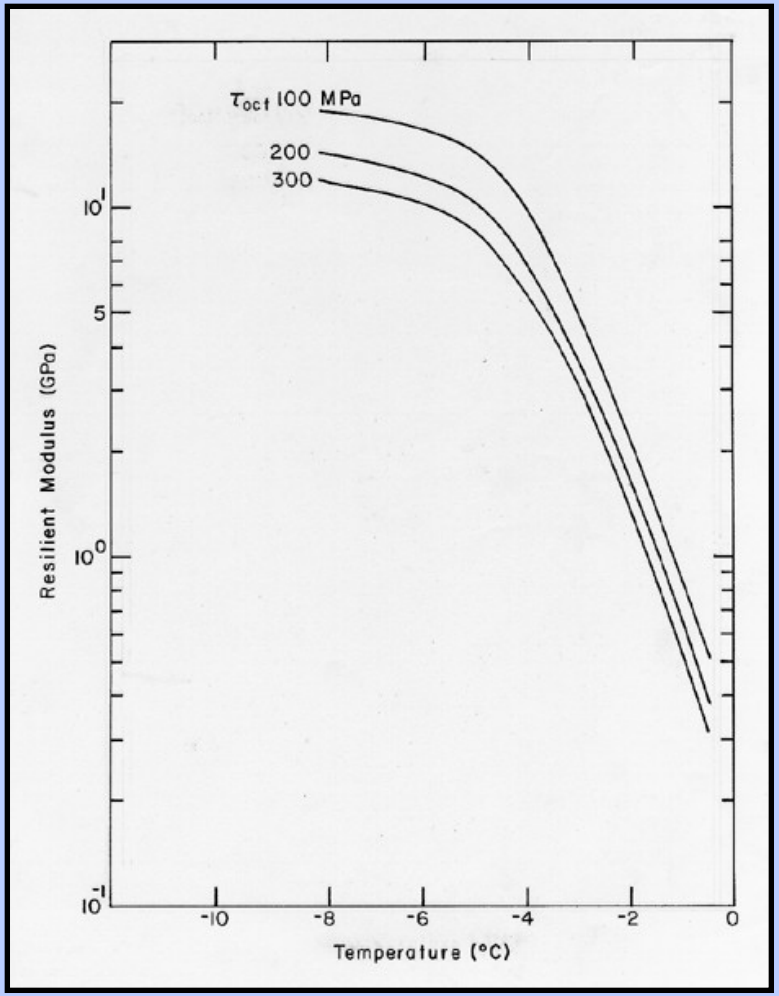
FY03 – 100K FY04 – 100K FY05 –50K FY06 –50K

Project Description

Objective – *Obtain mechanical properties as function of temperature, w.c. for JRAC library of soil.*

Scope -

- *Gather and summarize published properties as a function of temperature and water content.*
- *Laboratory testing to obtain properties for the major soils included in the library.*



Joint Rapid Airfield Construction

Plan/Progress

Plan –

FY 03- Gather data from past work, begin testing

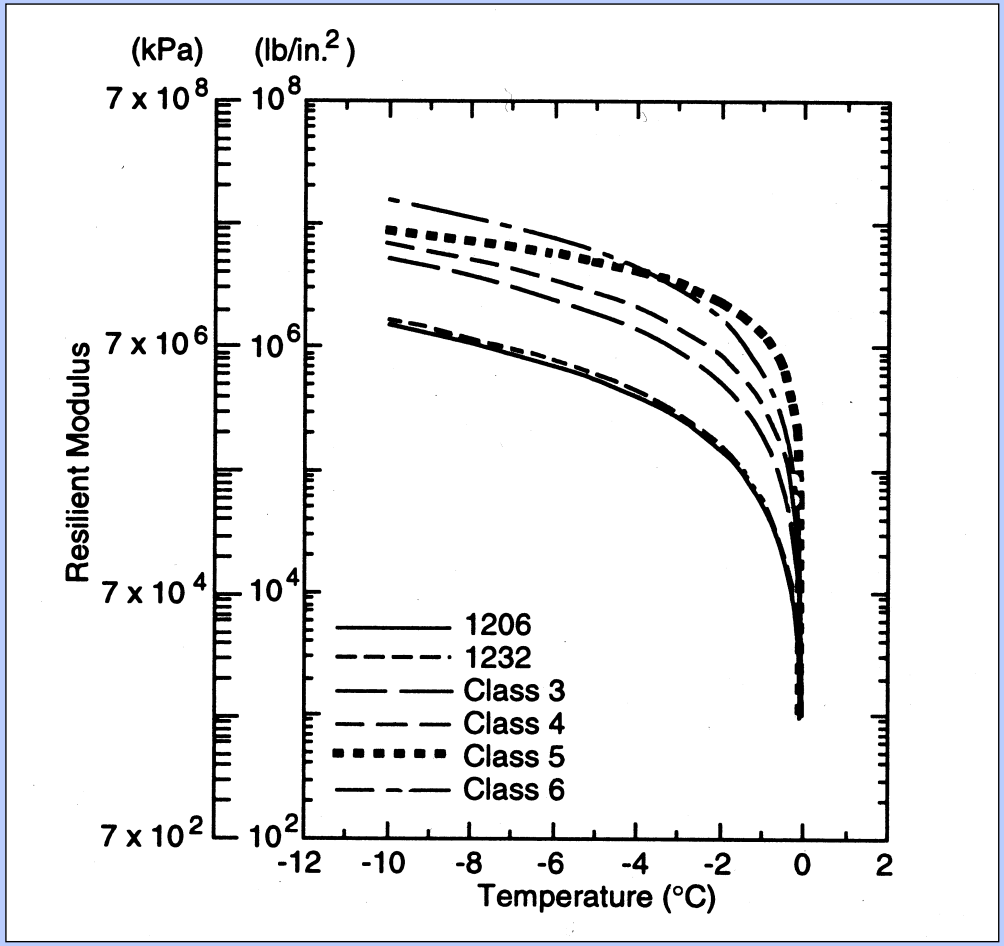
FY04-Continue testing

FY05-Finish testing

FY06-Prepare & provide data for inclusion in library

Progress –

- ***First year***
- ***Data on several soils (M_r, CBR, etc…)***
- ***Testing crushed rock provided by GSL (August)***



ERDC Engineer Research and Development Center

Joint Rapid Airfield Construction

Progress

Progress – ***Soil data base with properties pertaining to freezing and thawing conditions is being established using existing information. This will be incorporated into the JRAC library of soil.***

Class	Atterberg limits		max dry density (pcf)	OWC (%)	FS	K_s (cm/hr)	unfrozen moisture %			M_r (psi)					
Name	LL	PL								frozen-temp			thawed-%saturation		
							20˚F	30˚F	32˚F	20˚F	30˚F	32˚F	100%	80%	60%
CL	37	18.5	117.8	15.5	v. high	0.0087	7	11	27	7x10E5	1.1x10E5	1.3x10E3	2.3x10E4	4.0x10E4	9.0x10E4
CL	26.4	10.9	124.4	11.9	high	0.14	5	7.5	25	5.5x10E5	1.2x10E5	2.0x10E3	2.9x10E2	4.0x10E3	4.5x10E5
SW			131.8	7.6	high	4.5	0.5	1.5	9	2.3x10E6	3.0x10E6	6.5x10E3	7.0x10E3	8.0x10E3	1.0x10E4
SM			126	10	high	2.8				3.5x10E6	9.0x10E5	2.8x10E3	2.2x10E3	4.5x10E3	1.0x10E4
GW			132.7	8.1	med	5.54				5.0x10E6	2.0x10E6	1.0x10E4	1.5x10E4	1.9x10E4	2.1x10E4
GW			130.4	2.1	negl.	6				1.0x10E7	1.5x10E6	3.5x10E4	2.2x10E4	3.5x10E4	4.0x10E4

ERDC Engineer Research and Development Center

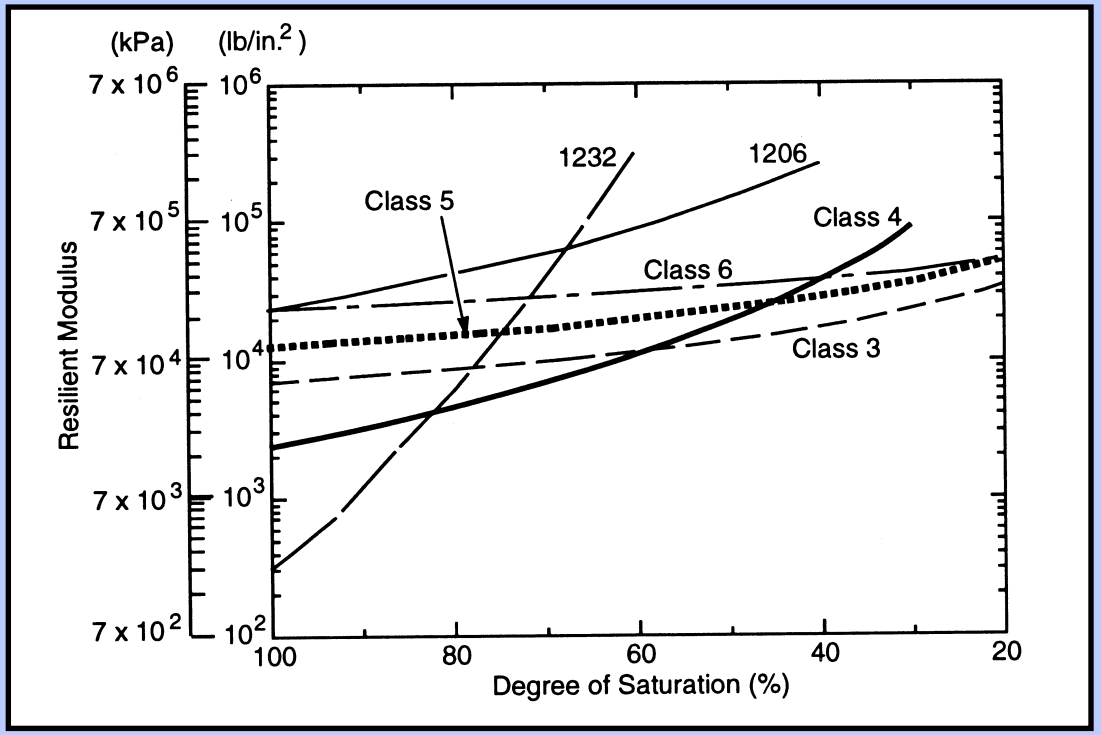
Joint Rapid Airfield Construction

Product

Description – Resilient modulus as a function of temperature and water content

FY04 Demonstration – Data will be included in JRAC library

Transition Medium – Data provided in Excel



ERDC Engineer Research and Development Center